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British Museum (Natural History).

Instructions for Collectors:

No. 1A.—MAMMALS, PART II.

**SKELETONS, with Special Notes on the
Collection of Specimens of CETACEA.**

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Frederic*
By S. F. HARMER, Sc.D., F.R.S.,

Keeper of the Department of Zoology.



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Mammals, Part II.

SKELETONS, with Special Notes on the Collection of Specimens of CETACEA.

By S. F. ^{John} ^{Frederic} HARMER, Sc.D., F.R.S.,

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I.—Mammals other than Cetacea.

1. PRELIMINARY HINTS.

THE preparation of skeletons in the field should go no further than the removal of sufficient flesh to ensure freedom from putrefaction. Every care should be taken to leave the bones naturally attached to each other, and with this object in view it will be sufficient, after removing the internal organs—heart, lungs, liver, intestines and so on—to cut the flesh roughly from the body and legs, and to expose the carcass thus cleaned to the sun. In small animals the limbs should not be separated from the rest of the skeleton. In those of larger size, the fore legs should be removed *with* the blade-bone, and the hind legs should be detached at the hip-joint. If not too large, the limbs should then be tied firmly to the rest of the skeleton. This is most important, especially where several skeletons are packed in the same case. To save space and to facilitate packing, each limb should be folded on itself. In very large skeletons, it may be necessary to separate the fore leg from the shoulder-blade, and even to subdivide the limbs; care being taken to cut the principal joints without injuring the bones. The tail should be turned forwards so as to lie inside the body. On no account should any preservative be used.

If the skin of the animal is being prepared as well as the skeleton, the bones of the feet should be left in the skin, unless the specimen is of large size. If the entire skin is not being

* In drawing up these Instructions I have received much valuable assistance from my colleagues Mr. O. Thomas, F.R.S., and Mr. W. P. Pycraft.

kept, it may be desirable to leave the hands and feet covered by skin, in order to avoid the loss of any of the small bones, and to prevent those of different limbs from being mixed. If these bones are brought back loose, it is impossible to arrange some of them (particularly those of the fingers and toes) with any certainty that they are being placed in their proper order. Whenever possible, skeletons should be secured of male, female and young animals. In every case in which the species is not definitely known, care should be taken to attach to the skeleton a characteristic piece of the skin, showing the colour of its fur or wool. This must belong to the particular individual whose skeleton is being prepared. It is very desirable to indicate what species the skeleton probably belongs to by reference to the collector's number of skins sent at the same time. In all cases, a label recording the precise locality in which the animal was killed, with altitude and date, and the sex of the specimen, should be tied to the bones. If the skeleton is sent in more than one piece, each part should be separately labelled, so that there can be no possibility of mixing the parts of different individuals.

2. MORE DETAILED INSTRUCTIONS.

After the removal of the skin, the abdomen should be cut open from the end of the breast-bone to the hip-girdle; and from the cavity thus exposed the whole of the contents should be removed. After the intestines, liver and stomach have been taken out, the "midriff," at the front end of the cavity, should be cut through to allow of the removal of the heart and lungs. The gullet and windpipe can be pulled out from the front of the neck. Special care must be taken to avoid injury to the hyoid bones or tongue-bones, which generally run from the region of each ear towards the lower surface of the larynx (at the front end of the windpipe) and back of the tongue, where the two series are joined by means of a bone in the middle line.

All superfluous flesh should next be cut away from the limbs, trunk and head. In small animals there is no need to remove any flesh from the ribs. Particular care should be taken, throughout the operation, to avoid cutting or breaking any of the bones.

The skull should be severed at the joint which connects it with the neck, and not by chopping through the neck-bones. In very small animals it may, however, be left in place. After the separation of the skull, as much as possible of the brain should be removed by stirring up the contents of the brain-case, through the opening at the back of the skull, with a blunt stick. This process will be facilitated by pouring water into the brain-case. The top of the skull should not be sawn off, and no attempt should be made to clean out the whole of the brain from the more inaccessible regions of the skull, since injury may easily be caused to the bones lining the brain-case if too much cleaning is attempted.

Unless the animal is of large size, the tongue may be left to dry up, and the tongue-bones already alluded to will thus be retained in place.

If time permits, and there is an abundance of water at hand, it is well to remove the blood from the roughly cleaned skeleton by soaking it for a day or two in water, preferably running water. For safety's sake the carcass should be placed in a basket, or tied up in a sack. Special precautions may be required in places where there are predaceous animals such as Crocodiles or other aquatic carnivorous forms. But where the climate is unfavourable, or water scarce, this soaking may be dispensed with.

The further treatment of the skeleton must depend a good deal on the size of the animal. If it is small, there will be no great difficulty in getting it properly dried, and it can then be packed in one piece, taking the precaution of turning the end of the tail in so as to be protected by the backbone and ribs. If it is large, the limbs may be detached separately; removing the shoulder-blade, which carries the rest of the fore limb, from the ribs, and dividing each hind limb from the pelvis or hip at the articulation of the thigh-bone with that part.

It may further be necessary to cut the backbone into sections of convenient size for packing. This division can be effected at any point, provided it is made in such a way as to avoid injuring the vertebrae or constituent bones of the backbone. It will be found quite easy to separate two vertebrae from one another if the knife is inserted first on the lower side (that which comes nearest the cavity of the thorax or abdomen). The two parts of the backbone on either side of the cut are then bent upwards, away from the cut. The following may be indicated as convenient points for dividing the backbone:—junction of neck and thorax; junction of thorax and abdomen. If the cuts are made as above, the thorax, consisting of vertebral column, ribs and breast-bone, may be packed so as to contain the skull and some of the other parts of the skeleton.

The rough skeleton, or the parts into which it has been divided, should next be hung up in a dry place, where there is a free current of air, and protected, if necessary, from attack by predaceous animals. Before the parts become quite dry it will be advisable to fold them in a position convenient for packing.

When thoroughly dry, the skeletons may be packed in boxes. Sawdust, especially pine sawdust, may conveniently be used, as it absorbs moisture and prevents any unpleasant smell. Each skeleton should be wrapped separately in paper or canvas, to avoid the danger of getting its parts mixed with those of other specimens, which might happen, for instance, in a skeleton attacked by beetles on the way home. This precaution is specially important for skeletons of small size; but in every case the greatest care should be taken to label and pack the parts in such a way that no admixture of this kind is possible. The value of a

specimen is destroyed if there is any suspicion that all the bones may not be those of a single individual.

The skin of an animal prepared for permanent preservation should always be accompanied by *its own* skull, even if the rest of the skeleton has not been kept. But a skull by itself may be worth preserving if the collector gives every possible assistance in determining the species to which it belongs. This is best done by stating that it is of the same kind as some other specimen, obtained at the same time, whose skin is in the collection sent to the Museum. If this cannot be done, part of the skin can sometimes be sent to aid in the determination, and notes may be made of the coloration of the living animal.

In the males of Monkeys, Carnivora and Rodents there may be present a loose separate bone in the penis, which should also be preserved, dried and fastened to the rest of the skeleton. And in some few animals, notably the Cats, the collar-bone is rudimentary, and care should be taken that it is not thrown away if the limbs are taken off.

II.—Cetacea (Whales, Dolphins and Porpoises).

The collection of Cetacea offers special difficulties, but useful work may be done if advantage is taken of suitable opportunities. Whales and Dolphins are not infrequently stranded on the coast, and smaller kinds are sometimes caught in fishermen's nets.

No satisfactory way of dealing with the skins of these animals is known, and it is accordingly not desirable to waste time in preparing skins which can neither be stuffed nor made much use of in any other way. The skeleton is the part which is most valuable from a scientific point of view, but it is important to have a record of the external appearance of the animal from which it was derived.

In collecting Cetacea, the first thing to do with any specimen is to make certain measurements and notes on its external appearance.

The more important measurements to be taken are those indicated in Fig. 1, B; but the length of the paddle or flipper (fore limb), measured along its lower border, and the distance between the vent and the opening of the reproductive organs should also be recorded.

It should be ascertained whether the mouth contains "Whale-bone" (baleen) or teeth. In the former case, note the number of blades of baleen* which grow on each side of the palate (Fig. 2), and, if possible, the length and breadth of the largest blade. The

* The number of the larger blades—those which constitute the main series—should alone be counted.

colour of the baleen-plates and of the hairs which fringe their edges turned towards the cavity of the mouth should be carefully recorded, and it should be noted whether all the blades are of the

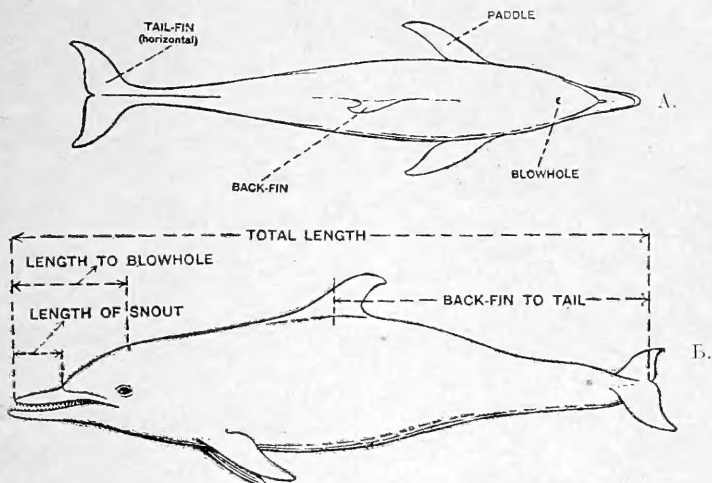


FIG. 1.—A, Back view, and B, side view of a Dolphin (a Toothed Whale), to show how the principal measurements should be taken.

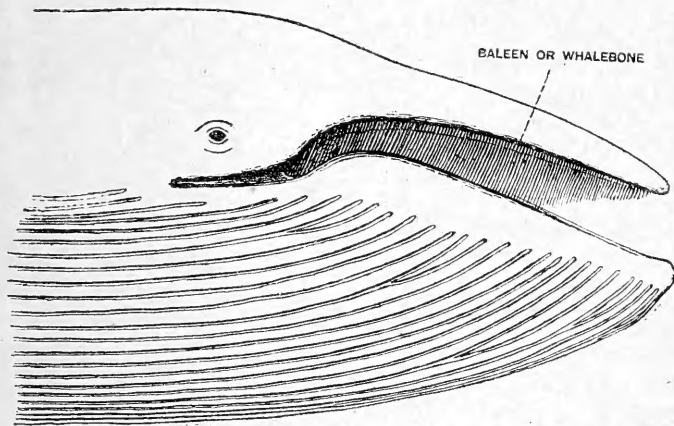


FIG. 2.—Head of Whalebone Whale, showing the whalebone or "baleen" of one side in place and the grooves on the skin of the throat.

same colour. The characters of the baleen are particularly important in distinguishing the species of the Whalebone Whales. In Whales of this kind, note further whether the skin of the throat

and lower part of the thorax is marked by a number of deep longitudinal grooves (Fig. 2).

If teeth are present, state their number, on each side of each jaw, recording also their average diameter at the base, their length and their shape. In several kinds of Whale the teeth are greatly reduced in number, even to a single pair (Fig. 3); or one or more

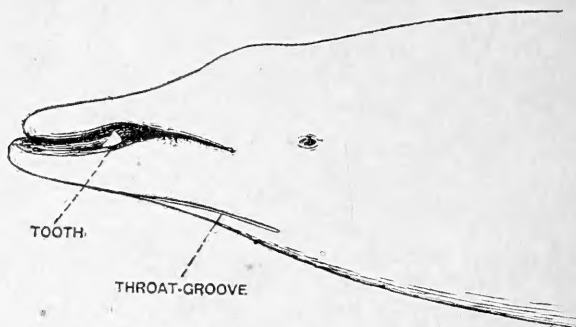


FIG. 3.—Head of a male Sowerby's Whale, in which only two teeth are present, one on each side of the lower jaw. In the females and young of this species, the teeth are concealed beneath the gum, and none are visible.

pairs of teeth may be present beneath the gum, the animal then appearing toothless. In Whales with only a few teeth or none visible, note whether there are a pair of longitudinal grooves on the skin of the lower side of the throat (Fig. 3).

The shape of the head should be described, and a sketch made of the profile (side view). In many kinds of Dolphin, the front part of the upper jaw is sharply marked off from the rest of the head (Fig. 1). The length of this snout or "beak" should be noted.

The external coloration should be recorded, special attention being given to the distribution of the dark and light colours respectively.

A large Whale is too bulky an object to be dealt with by an unaided collector. It will thus be sufficient to note the above particulars and to secure a blade of baleen or a tooth, as the case may be. If a whaling station is visited, there may be an opportunity of securing some of the remarkable shell-like ear-bones which are readily separated from the skull in Cetacea. Special care should be taken to ascertain what kind of Whale each such ear-bone belonged to.

The skeletons of Whales or Dolphins are prepared in the same way as those of other Mammals. In opening the abdominal cavity, to remove the viscera, look specially for the pelvic bones (Fig. 4, *p*), which represent the hip-bones of other Mammals. These are a pair of separate bones, perhaps six inches in length in a large Dolphin, which are embedded in the flesh near the vent, one on

each side of that aperture. They are not always easy to find, as they are not articulated with any other part of the skeleton. The hyoid or tongue-bones should be looked for, as in other Mammals; but they offer little difficulty, as they are of considerable size.

In commencing operations, the two lobes or flukes of the tail and the back-fin may be cut off, as they contain no part of the skeleton. It is generally advisable to cut through the blubber, and to remove it in strips, starting from the tail and working forwards along the body to the head.

The paddles or flippers should be cut off at the shoulder-joint; or, in the case of the smaller species, the shoulder-blade, with the flippers attached, may be removed from the body in one operation. The flippers should in all cases be preserved entire, no attempt being made to remove their skin or blubber or to separate the bones supporting them. They need practically no preparation, and may be left to dry up as far as their oily nature permits them to do so. Any ordinary disinfectant may be applied to their surface occasionally if signs of putrefaction should be noticed.

Complete paddles, with the skin intact, of the following species of the larger Whales are specially wanted:—the Greenland Right Whale (*Balaena mysticetus*), the Pacific Grey Whale (*Rhachianectes glaucus*), and the Southern Pigmy Right Whale (*Neobalaena marginata*).

After the removal of the blubber and flippers, and after the pelvic bones have been taken out, the intestines and other viscera may be removed, and the flesh cut away from the bones, in much the same way as in the case of any other Mammal.

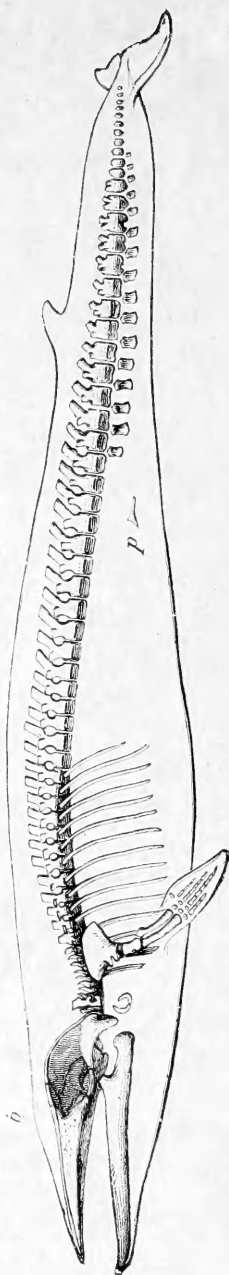


FIG. 4.—Skeleton and outline of the Common Rorqual or Fin-Whale (a Whalebone Whale). *b*, Position of blow-holes; *p*, pelvic bone. The tongue-bones are indicated, just below the lower jaw. The breast-bone is not represented. About $\frac{1}{12}$ natural size.

The skull should be carefully disarticulated and the brain removed through the hole at its base, the flesh being cut away from the head so far as this can be done without injuring the bones. The backbone should be divided into sections, if necessary, the divisions recommended on p. 3 being equally suitable for Cetacea. In the case of large specimens it may be necessary to separate the ribs from one another. In doing this, avoid injury to the breast-bone, and disarticulate each rib from the backbone in such a way as not to damage it.

Many species of Cetacea have been described on the evidence of skulls or other bones, no information as to the external appearance of the living animals having been given. In other cases the reverse has been true, species having been described from their external characters without reference to the bones. It is accordingly specially important to make sketches or take photographs of the external appearance of a Cetacean before preparing its skeleton; and work of this kind may be important in helping to decide difficult questions relating to the species. It is specially desirable to obtain information, based on actual specimens, with regard to the species of Dolphin which inhabit the open ocean, far from land.

If the entire skeleton is not prepared, the skull and the two flippers (complete, with skin intact) should be secured, the external characters of the living animal being noted and sketched.

Every specimen should be carefully labelled with locality, date of capture, total length of specimen and sex. The male organ of Cetacea can be completely retracted, and when it is thus concealed it may be possible to mistake a male for a female. The female may be recognized as a rule by the occurrence of a longitudinal slit in the skin, on each side of the reproductive opening, this slit usually concealing the retracted nipple. The length of the interval between the vent and the opening of the reproductive organs should be stated in the measurements of the fresh specimen.

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